# inhalation therapy

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October 1960
Volume 5 Number 5

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**Annual Meeting**

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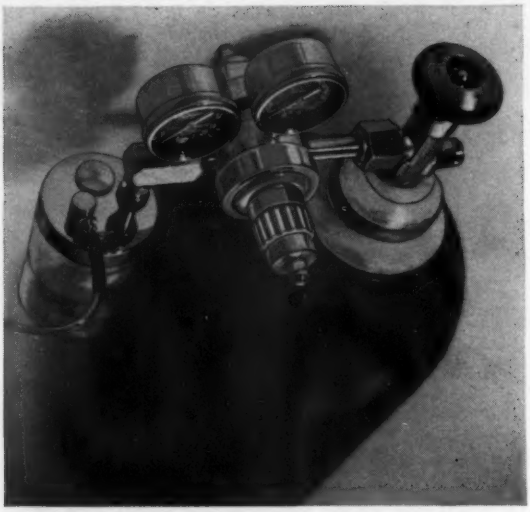

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VOLUME 5 NUMBER 5

# inhalation therapy

OCTOBER 1960

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1. Kirkwood, E. S.: Nursing World 129:8, 1955.

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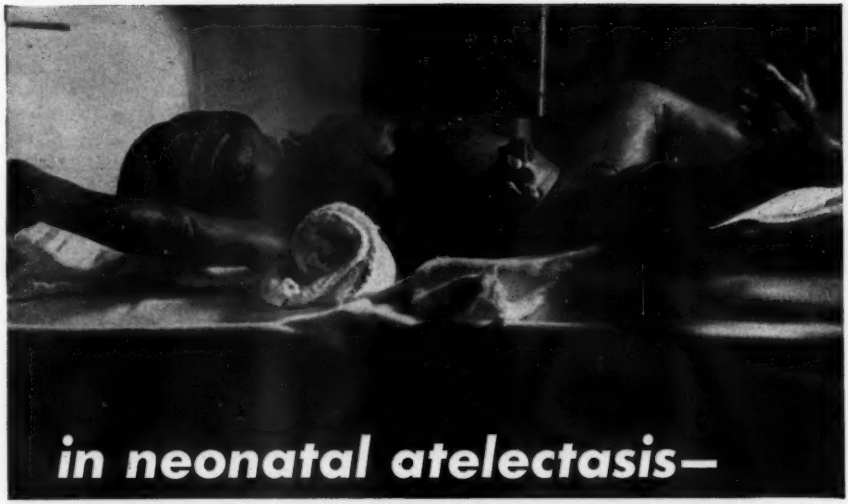

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1. Smessaert, Andre; Collins, V. J., and Kracum, V. D.: *New York J. Med.* 55:1587, June 1, 1955.
2. Banyai, A. L.: *Geriatrics* 14:621, Oct., 1959.

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*Editorial*

# Financing Schools

PROBABLY in most cases the operation of the school of inhalation therapy is subsidized in some degree by the institution in which it arises—at least to the extent of imposing on various faculty members for lectures in the medical sciences, the use of classroom facilities, and so on. But beyond these there are certain other operating costs, such as office help with correspondence, records and accounting; and the loss from direct patient service of much of the time of the department head who is usually the technical head of the school and one of its chief instructors.

Can the income from patient service charges—which is the only income most inhalation therapy departments have—be used to help meet these expenses? Starting a school in a department creates an increase in operating costs of that department which will eventually be reflected in an increase in patient service rates. This, naturally, is passed on to all of us in increases in the premiums we pay for hospitalization insurance, or in taxes we pay to support welfare agencies that pay the bills for those without insurance.

What other incomes might offset this additional expense to an inhalation therapy department?

Some schools charge tuition, and operating expenses are at least in part defrayed by that income. There is further comment about this below.

More commonly, in order to avoid charging tuition, the institution hires the student at a trainee wage lower than regular starting pay for technicians. Then, by using the student for some of the work of the department, it is possible to have an adequate staff for *better* patient service without appreciably increasing the department payroll.

Of course, there is a very definite limit to this arrangement, and the American Medical Association will not approve any school that so exploits its students as to retard their training for its own benefit. (In their own words, in the "Essentials of an Acceptable School for Inhalation Therapy Technicians,"* Section VI on Ethics states specifically that "Schools conducted primarily for the purpose of substituting students for paid technicians will not be considered for approval.")

There are several other drawbacks to this method of financing. One is that it excludes all but single or financially independent individuals who can manage to subsist on the "slave" wage. This is very unfortunate, because many of our most stable, dependable and worthwhile applicants are married and have families to support. Going into a training period which imposes this sort of financial strain on their economy is just out of the question. Further, the very low pay is too likely to succeed in enrolling only those who can find nothing else.

Another serious shortcoming of this strictly "in-service" training program is that

*N.Y. State Journal of Medicine, 15 Apr 56, pp 1319-20.

since there is no tuition or other income for the school, it is extremely difficult for the school to find (1) resources to provide any more than practical training, or (2) enough of the students' and staff's time free for lectures, movies, tapes, meetings, etc.

In searching around for answers to these knotty problems, we found that we are not the only ones experiencing them. Most of an issue of HOSPITALS, Journal of the American Hospital Association, was recently (October 1, 1959) devoted to the topic of Financing Nursing Education.

The Blue Cross premium increases which have been necessitated by (among other things) increasing costs of nursing education, "have been criticized by both the public and regulatory officials," said William K. Turner in his article, "An Unfair Burden for 1100 Hospitals," in this symposium, in which it is shown that whereas hospitals and industries and other groups all over the country use nurses, the only ones that bear the expense of their education are the 100-odd hospitals which train them. He continues, "I for one have been working to gain acceptance of the idea that the portion of the education cost remaining after deduction of the value of student services should be provided from sources other than the patient or those who pay on his behalf."

Kenneth Williamson, one of the Associate Directors of the AHA, said in his contribution, "The AHA Approach: Spread the Cost over Community, State and Nation," that the problem could be solved "by removing the cost from the patient's bill and spreading it over community, state and nation . . . by means of a continuing program of federal and state aid with assurance of a steady flow of nongovernment funds."

Henry C. Mills in his "National League of Nursing Study Seeks Base for Future Planning," said that before intelligent planning can be done regarding who will finance the program and how, it is necessary to have accurate analyses of just what the program costs. This is not only easy to come by, because of the need to estimate closely the value of student services to the department. Mills does not plump for federal or state aid; he feels that nursing education is like other advanced education, and that its cost should be borne by society and by the students. He concludes with the remark, "The more the concept of the education of nurses gains acceptance, the more the pattern of financing should approximate that of other programs of higher education."

The Illinois Hospital Association, in a study reported in this symposium by Mrs. Shirley M. Lindberg, R.N., and Mildred Corbin, in the article "Schools Must Face Financial Facts of Life," arrived at the conclusion that schools should raise tuition and fees so that they "cover the major share of educational costs." (in line with Mills' suggestion) Most of the schools apparently maintain the students at the hospital's expense—which means at the patient's expense. This should be corrected, say Lindberg and Corbin, by establishing room and board charges, against which can be credited the value of student services. (Local students who can live at home get a further break here.) They also suggested that civic, industrial and philanthropic groups be stimulated to provide scholarship and loan funds to help students defray tuition and other costs.

The point is made that tuition makes possible better-qualified faculty and overall program; and that surveys have shown highest percentage of enrollment capacity filled at the schools with highest tuition rates.

How do these findings apply to schools for inhalation therapists? It is plain that our problems are not yet as complex as those of nursing schools, which are larger and more diverse; but since ours is virtually the same *type* of educational program, in which a hospital is as essential in the education of a therapist as it is in that of a doctor or nurse, we feel that (1) the general principles of financing them apply here as they do in any other post-secondary school education, especially of professional nature, and (2) that in spite of the hospital affiliation, it is not fair to have the hospitals subsidize such schools at the expense of the patients.

The chances are that if we took a leaf from the nurses and heeded these warnings now, while organizing our schools, we might never find ourselves in quite the mal-financing dilemma many of them now face.

**—James F. Whitacre**
**Editor**

# Effective Humidification Therapy Mobilizes Tenacious Secretions

**William Miller, M.D.**
**Associate Professor of Medicine**
**The University of Texas Southwestern Medical School**
**Dallas, Texas**

There are numerous situations in which heated aerosols have proven to be more effective than cold aerosols. The decision to use tepid aerosol or superheated aerosol depends on the volume deposition of solution desired. Thus the temperature and character of the solution are altered to meet the demands of the situation. Higher temperatures and more concentrated solutions result in greater deposition of aerosol and more effective "wetting" of the bronchial tree. One should be guided by these criteria plus knowledge of the patient's ability to cough and evacuate secretions that are mobilized. Obviously, if more heat and higher concentrations are used, greater mobilization of secretions will result. In some instances, tracheal aspiration, exsufflation or tracheostomy may be necessary to deliver mobilized secretions or exudate.

*General Considerations.* In most people with chronic inflammatory bronchopulmonary disorders, cystic fibrosis included, the basic problem is the accumulation of an overwhelming quantity of mucoid secretions and inflammatory exudates. This immediately creates a vicious cycle of bronchial obstruction, impaired ventilation, poor reabsorption or evacuation of secretions, recurrent infection, and more secretions and exudate. This creates a dilemma from which most patients find it difficult to extricate themselves. The more severe the degree of ventilatory insufficiency, the more difficult this problem becomes.

Generally speaking, the factors concerned with the resolution of accumulated inflammatory exudates or secretions from the lungs are as follows: (1) the material either must be thin enough or free enough in the bronchial tree to be evacuated or readily reabsorbed, and (2) ventilation must be maintained effective enough either to mobilize this material or to aid in its reabsorption by pulmonary lymphatics. Clearly, the integrity of the underlying lung lymphatics plays a very important role in the amount of secretions that can be effectively reabsorbed.

In those patients in whom anatomical damage is most severe, the only route of clearing is by evacuation. However, in many instances, merely thinning the secretions or providing enough fluid vehicle and maintaining effective ventilation is adequate to obtain clearing. When these criteria are met, the capacity of the lung with a reasonable degree of anatomical integrity to reabsorb liquid material from the bronchial tree is literally tremendous. It is an age old trick of thoracic surgeons to loosen mucus plugs at bronchoscopy by the vigorous lavage of the bronchial tree with bronchodilator or vasoconstrictor agents and saline.

The only effective indirect method for depositing large quantities of liquid into the tracheobronchial tree is to use superheated aerosols (above body temperatures, up to 125° F.), in order to permit "rain-out" of the aerosol solution in the tracheobronchial tree.

One of the major factors in the persistent obstruction, particularly in children, is the effect of the high surface tension of secretions or exudate in causing the surfaces of the bronchial tree to approximate during forced expirations, coughing or even shallow breathing. Once approximated, the surface tension force resisting re-expansion of the bronchial tree is tremendous, and it may require pressures in the neighborhood of 60 to 80 cm of water to overcome this resistance. The use of detergent aerosols depositing large amounts of surface active liquid into the tracheobronchial tree materially decreases this surface tension effect.

The solutions and the duration of treatment depend on the indications at hand. Our first experience came with using assisted breathing in tracheostomized patients, including patients with poliomyelitis, where some method of effective humidification alone was desirable. In those instances, in a healthy respiratory tract, plain saline or 0.5% salt solution would be used in the heated aerosol unit; the more severe the respiratory tract disease, the more vigorous would be the medication.

In other words, in order to achieve maximum deposition of surface active material in the tracheobronchial tree, we might use straight detergent solutions without sodium bicarbonate which tends to create frequent mechanical difficulty with nebulizers; to this is added glycerine or propylene glycol in an amount to make a five to ten per cent solution. If intermittent short treatments are to be given, even higher concentrations of propylene glycol may be used. Bronchodilator aerosols are always used intermittently because of their effect in relieving congestion in the bronchial tree as well as bronchospasm, which is invariably present to some degree any

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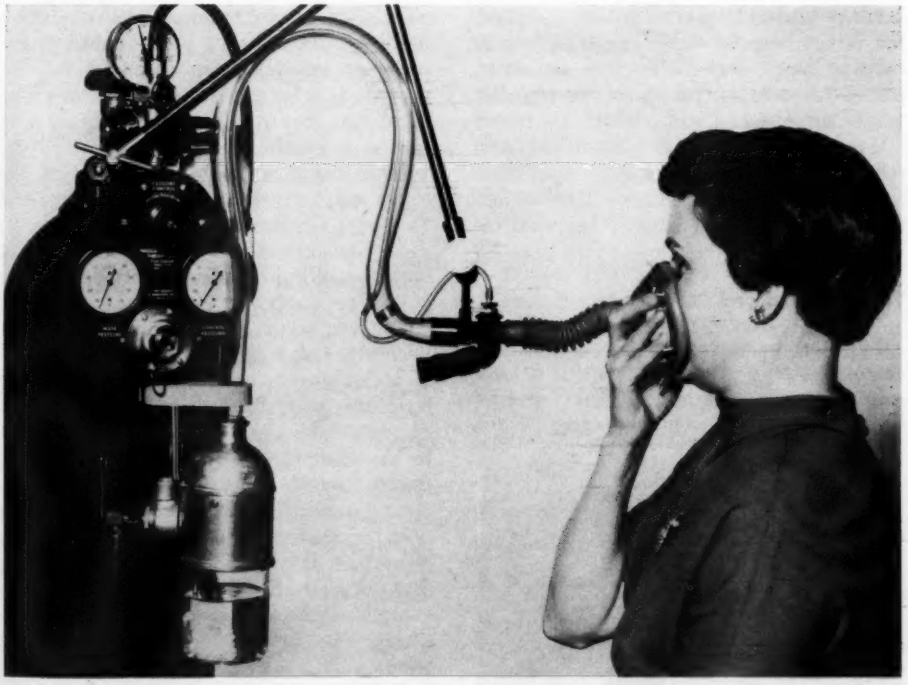

**This patient is demonstrating the use of a mainstream aerosol generator with intermittent positive pressure equipment to facilitate loosening of tenacious mucus.**

# What Does It Cost to Establish An Inhalation Therapy Service?

by Vincent Kracum

The establishment of an inhalation therapy department or service in a hospital would in the minds of some people constitute a new or additional expenditure on the hospital budget. In the smaller hospital, this may be a factor, but in the hospital with a capacity of 200 beds or more, this factor does not exist, since the administration of therapeutic gases must be accomplished by some service. Where a therapist is not assigned, the nursing department must assume this responsibility in full measure. In addition, the maintenance department becomes involved.

### Factors involved in cost

In determining the economic advantages associated with the establishment of any service in the hospital, it first becomes necessary to justify the time spent by the individuals performing that service. If one were to total the number of hours expended by nursing department personnel, there would be little doubt as to whether or not there is justification for the employment of personnel to administer inhalation therapy on a full time basis. The employment of an inhalation therapist on the premise that he can be kept busy handling inhalation therapy equipment, is only part of the evaluation of the economics involved. There are many other advantages to the employment of a therapist. Some of the major advantages are:

1. The equipment is used more efficiently, resulting in more effective therapy.
2. The gases are used more economically. This occurs when equipment is used properly, and is due to the diligent efforts of a therapist in some hospitals. In many hospitals, partially full and full cylinders or gases have been inadvertently returned to the manufacturer with the impression that these were empty cylinders. The therapist can eliminate this problem. In addition, by consistently checking the flowrates of oxygen, the therapist will make certain that adequate flowrates are used and that excessive flowrates are avoided, thus ensuring effective therapy and eliminating waste.
3. The equipment is properly maintained, resulting in not only longer life for

**Vincent Kracum,** Inhalation Therapy Consultant, Ohio Chemical & Surgical Equipment Co.

the equipment, but in many instances, *safer* inhalation therapy.

4. A proficient therapist can provide technical advice to the physician staff, and instruct nursing personnel in proper techniques.

5. Where a therapist is employed, the billing of patients receiving inhalation therapy is more accurate.

6. Inventory control of inhalation therapy equipment is best handled by the therapist. Who else is better able to identify this equipment?

Many benefits which accrue from the establishment of an inhalation therapy service are intangible, and become evident only after the service has been in operation for several months.

### Conflicting interests to be avoided

What does it cost to establish an inhalation therapy service? The two biggest factors involved are the salary for the therapist or therapists, and the establishment of physical facilities. The beginner or neophyte therapist should be paid a salary commensurate with that of a laboratory assistant or x-ray technician-trainee. A full-time, fully-trained therapist should be paid a salary commensurate with a laboratory or x-ray technician. The chief therapist's salary should be commensurate with that of a chief technician in the various divisions of a pathology department. It is realized, however, that this salary cannot be at the level of a chief biochemist or microscopist, because of the differences in the educational requirements for the latter two positions. As a further guide, the wage scale of an inhalation therapist can be established by comparing it to the wage scale of a physical therapist.

The cost of establishing physical facilities for an inhalation therapy service will depend on the individual hospital. In some hospitals this cost will be nil, since facilities already exist. In other hospitals it will require allocating space, acquiring cleaning and storing facilities, providing facilities for maintaining records, and facilities for testing and repairing equipment.

Some hospitals delegate dual responsibilities to the therapist. This is fine to a degree. However, when this decision is made, the assignments should be closely allied, or else the therapist may be regarded as a nondescript character, and will fail to gain the respect and cooperation of other hospital personnel. Financial reward is but one reason why people choose a particular field of endeavor. Personal satisfaction and self-respect in this endeavor are greater motivating factors. If the therapist is to have dual responsibilities, they must not conflict.

### Economic advantages

In some hospitals the therapist is assigned to the fracture room as well as inhalation therapy. With this type of organization, there exists conflicting interests. The therapist will not be proficient in either assignment. Other hospitals share the therapist with the central supply service. This arrangement appears satisfactory until the therapist is made nothing more than a delivery boy.

One of the most useful places the inhalation therapist can be assigned is the recovery room. The assignments are closely allied. Another area might be the outpatient department, giving aerosol treatments and administering pressure breathing therapy. There exists, however, the possibility that in the out-patient department the therapist may become a wheel chair or stretcher jockey, so perhaps assignment to the out-patient department on a part-time basis would become problematic.

### Determining economic advantages

The economic advantages to the establishment of an inhalation therapy service are many, as evidenced by the results obtained in many hospitals in North America. The decision to establish an inhalation therapy service should not be based solely on the economics involved. There are other advantages. The therapist can provide safer, more effective as well as economical inhalation therapy.

# sixth annual meeting will be the most colorful yet!

by Frank Huston

The Sixth Annual Meeting and Lecture Series of the American Association of Inhalation Therapists to be held at the Pick-Nicollet Hotel in Minneapolis from Monday, November 14 to Friday, November 18 will be the most colorful in A.A.I.T. history.

If you have taken note of the cover color on the August Journal and this month's issue, you have the color key to the meeting in Minneapolis. Programs, lunch tickets, booth drapery, etc., are all coordinated to match. Our object is to provide as much for the eye as we do for the brain.

Attendance at the meeting is expected to go well over 400 registrants (we had 386 registrants in Philadelphia in 1959), the speakers and discussion leaders are all highly esteemed authorities in their fields and the "Clinics" have been reinstated with seven companies demonstrating between 8:00 a.m. and 2:00 p.m. on Thursday.

The program will include lectures, roundtables, an "Exhibitors Night" party, where the registrants are the guests of our genial hosts, the exhibitors. Also included will be special sessions for the service members, the annual meeting which not only elects new officers and directors but, we hope, will see the first of the tests given for the Inhalation Therapy Registry.

The first day of the convention—Monday, November 14—will open with registration at 9:00 a.m. and the kick-off speaker will be Dr. Vincent J. Collins, associate professor of anesthesiology, New York University Post Graduate Medical School, discussing "Inhalation Therapy—Its Past and Future."

Dr. Collins will be followed by Mr. Gordon Eaverson, technical representative of the Puritan Compressed Gas Corporation speaking on "Industry's Role in the Development of Inhalation Therapy" and then Ross Hawkes, owner of the Hawkes Ambulance Service of New York will take over to discuss "The Interrelationship Between Service Companies, Doctors and the Patient's Family."

### Dr. Andrews to speak on "Registry"

Following the morning speakers at luncheon, the subject of the long sought after "Registry" will be taken up by Dr. Albert H. Andrews, attending broncho-esophagologist of Presbyterian-St. Lukes Hospital, Chicago.

Continuing in its spot on the first afternoon of the meeting will be the roundtable sessions, with Mrs. Leah Tharaldson, C. R. N. A., director of inhalation therapy, Northwestern Hospital, Minneapolis, again taking over the duties of moderator.

The topics and discussion leaders are:

"Responsibilities and Privilege of Regis-

tration." Dr. Andrews and Don Gilbert, chief inhalation therapist of the University Medical Center in Ann Arbor, Michigan.

"Basic Requirements of an Inhalation Department" will be headed by Miss Joan Grayson, R.N., Nurse Consultant for the Linde Company, New York.

"I. P. P. B. Treatment and Problems" will have as its moderator Mr. Donald Livingston, director of inhalation therapy at the Charles T. Miller Hospital in St. Paul.

**Public Relations to be discussed**

"Public Relations with the Nursing Teams," with Mrs. Delia Day R.N. head nurse of the post anesthesia recovery room at Northwestern Hospital in Minneapolis acting as moderator.

"Inhalation Therapy in the Critical Patient" will be covered by Miss June Fransein R.N., head nurse of the intensive care unit and Mrs. Julia Craigie, chief inhalation therapist both of the Northwestern Hospital in Minneapolis.

"Humidity for Adults" will have both Sister M. Lucida C. S. J., C. R. N. A., director of the school of anesthesia and David Nuerenberg, chief inhalation therapist from St. Mary's Hospital in Minneapolis.

"Humidity for Pediatrics," Mrs. Ione Hendricks, R.N., supervisor of the pediatric department will share duties with Mr. Reino Ahonen, inhalation therapist, both of Northwestern Hospital in Minneapolis.

**A.A.I.T. president to speak**

"What is Your Problem" will have Noble Price, president of the A.A.I.T. and the chief inhalation therapist of the Methodist Hospital in Indianapolis plus Mr. Shirley Bell, C. R. N. A. president of the upper midwest chapter and instructor at the school of anesthesia of Northwestern Hospital, to share duties.

Tuesday's general session will get under way with Dr. Edwin Levine, director of the department of inhalation therapy at Edgewater Hospital in Chicago's speech on "Oxygen P. R. N."

Dr. Helmholz of the Mayo Clinic in Rochester, will follow Dr. Levine a talk on the "Types of Hypoxia, and Effects of Oxygen Administered by Various Methods."

"Real and Fancied Dangers in Oxygen Administration" will have Dr. Allan Hurst, director of inhalation therapy at the General Rose and St. Anthony Hospitals in Denver, Colorado, as the guest speaker.

**Administrator to be luncheon speaker**

"The Hospital Administrator Looks at the Inhalation Therapy Department" will be the topic at luncheon for Mr. Russell C. Nye, administrator of the Northwestern Hospital in Minneapolis.

The afternoon sessions will resume with Dr. Andrews talking on "The Administration of Oxygen to the Unconscious Patient and to the Tracheotomized Patient" followed by Dr. Collins speech on "Inhalation Therapy in the Post Anesthesia Period."

Wednesday morning, bright and early, Dr. Meyer Saklad, head of the department of anesthesiology at the Rhode Island Hospital, in Providence, Rhode Island, will talk on the "Selection of Specific Equipment for Inhalation Therapy."

Following Dr. Saklad, the subject of "Inhalation Therapy in Bronchial Diseases" will be discussed by Dr. Olsen of the Mayo Clinic, Rochester, Minnesota.

"The History and Development of B. L. B. Oxygen Mask" will be the subject to be jointly digested with your luncheon fare. And to help in the digestion will be Arthur H. Bulbulian, D. D. S., who is the director of the Mayo Foundation Museum.

After the luncheon, when the sessions are once more in progress, Dr. Malcolm A. McCannel, assistant clinical professor of the department of ophthalmology at the University of Minnesota Hospitals will speak on the subject of "Oxygen in Incubators."

The second afternoon speaker will be Dr. Richard Tudor, pediatrician from Minneapolis, who will discuss, "Inhalation Therapy for the Child."

The annual business meeting will take place Thursday morning with A.A.I.T. president, Noble Price presiding. This

meeting will include the president's report, chapter delegates, committee reports, the treasurer's report and the election of officers.

At the annual report luncheon, Mr. Albert Carriere, executive director of the A.A.I.T. will sum up the progress of the association in his speech "Let's take Stock."

Then, following the luncheon you are on your own to enjoy the wonderful shopping facilities and beautiful sights in Minneapolis.

**Friday starts with general papers**

"Care, Maintenance and Operation of Regulators and Flow Meters" will be the first of the general papers to be presented on Friday morning.

To present the problem will be Mr. Richard T. Danks, supervising engineer of the Motherhouse, St. Francis Convent in Springfield, Illinois.

"Preparing the Patient for Inhalation Therapy" will be the next topic, given by Mrs. Agnes Forrest, secretary-treasurer of the A.A.I.T.

Melvin H. Hall, chief inhalation therapist of the Variety Children's Hospital in Miami, Florida will present a paper on "Pharmacology and Inhalation Therapy."

"The Care and Feeding of Chapters," prepared by Mr. Don Gilbert and "Getting Along with Other Services" being given by Mr. Noble Price, will round out the morning.

At luncheon, Dr. Alvan L. Barach will talk on the subject of "Inhalation Therapy, a Heritage and a Future."

The industrial members breakfast will be held on Wednesday, and the service members will meet at the same time on Thursday.

Other annual meeting features will include the board of directors' and board of advisors' meetings, and conferences with the executive director for members on Monday and Thursday.

Registration fees for the annual meeting and lecture series are: Members $40 —non-members: $50. These cover admission to all sessions, five luncheons, and admission to exhibits.


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## EXECUTIVE DIRECTOR

***Lest We Forget***

Albert Carriére

As we prepare for our sixth annual meeting and lecture series, we can look back at the road we have traveled, and, depending upon our attitude, breathe a sigh of relief, satisfaction, or, indeed, dissatisfaction.

There are many indications that the American Association of Inhalation Therapists is at last approaching the stature of an honest-to-God professional, paramedical association.

Our international membership is about at the one thousand mark.

We have received the sponsorship of two highly respected medical groups, the American College of Chest Physicians and the American Society of Anesthesiologists.

Throughout the United States and Canada we have established some twenty chapters.

We have received encouragement and assistance from industry, in the form of grants, advertising space in this journal, and rental of booths at our annual meeting.

We have cooperated with another smaller – but also important – group the Service companies.

At the same time, we have convinced all these groups, oftentimes making ourselves quite unpopular in so doing, that no group or member of a group is going to dominate the A.A.I.T. to the detriment of its professional status, or to the disadvantage of particular groups or their members.

This is not always the simplest thing, for there are times when the interests of our own and other organizations are at odds. Nevertheless, it is one of the duties of the Executive Director to remind offenders that there can be no use of the A.A.I.T. for purposes that are not specifically listed in its charter.

The point of all this is the undeniable fact that the A.A.I.T. is coming of age. Six years ago, any of the major difficulties encountered during the past year might have "sunk the ship"; this year, however, the A.A.I.T. was strong enough to survive.

Most exciting indication of all is that at last it appears that the Registry Corporation is a fact, and that the first examinations for "Registered Inhalation Therapist" may be given this November at our sixth annual meeting.

Cause for rejoicing? Yes, indeed! Every member of the American Association of Inhalation Therapists has reason to be proud of what we have accomplished.

Let us not, however, forget that "eternal vigilance" is the price of professionalism. In our joy at these accomplishments, let us not for one second lower our sights.

If the road behind us has been rough –

and it has! – let's keep in mind the fact that the road ahead may be just as rough.

Let's face the future of the A.A.I.T. with the determination not to swerve from the path of true professionalism, whose only justifiable motivation is better patient care.

If we do this, the other things we want: increased recognition, enhanced stature, better cooperation from other services, stricter educational requirements, all these things will inevitably follow.

Finally, let us not forget the debt of gratitude we owe to the many people who have dedicated themselves to the growth of our Association: the Board of Directors, the members of the various committees, the officers, the hard working members of the Advisory Board, and the people serving on both the Industrial Advisory Committee and the Executive Committee for Service Companies.

In the final analysis, we get things done because of dedicated and hard-working people, who have given of their time, effort, interest, and money to help the A.A.I.T. reach its present state of development.

To all of them a heartfelt: Thank you!

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**Annual Meeting**

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## AAIT CHAPTERS

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For information on AAIT membership, chapter activities and meetings, write to the chapter secretary nearest you.

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time there are secretions accumulated in the bronchial tree; the mere presence of a foreign body incites a bronchoconstrictor response in the lung.

As mentioned above, occasionally the problem arises wherein because of the presence of severe ventilatory insufficiency either secondary to severe and extensive obstruction in the bronchial tree by secretions, or by underlying anatomical change, the sudden loosening of large amounts of peripheral bronchial secretions causes an apparent worsening of ventilatory function in the patient. Obviously, if secretions are to be mobilized by whatever method, *one must be prepared to evacuate these secretions for the patient if he is too weak or unable to evacuate them by virtue of ventilatory insufficiency.*

If this situation is anticipated, it is sometimes wise to proceed with caution until enough improvement is accomplished to see that the patient will be able to evacuate his own secretions. Where a good airway is established, such as through a tracheostomy, such precaution is not necessary. Also, where a patient has been trained to use exsufflation with negative pressure or a reasonably forceful cough is present, one need not hesitate to proceed with vigorous therapy. However, it sometimes requires a great deal of reassurance of the patient, and teaching him to use positive pressure assistance continuously until he is able to evacuate his own secretions effectively. These same problems arise in patients who ordinarily have good function, but pool secretions because of pain associated with accidental trauma or the post-operative state. This problem cannot be considered a contra-indication to effective aerosol therapy, but an indication for improved evacuation.

Perseverance has always been rewarding. Moreover, we are constantly guided by the awareness that there is invariably more accumulated secretions in the lungs than is apparent by the ordinary clinical criteria. This can be very convincingly demonstrated by starting vigorous treatment on a patient who has severe ventilatory insufficiency and alleges to have only a dry unproductive cough. Such patients after three or four days of therapy often begin to bring up tremendous amounts of thick mucoid and often mucopurulent plugs. Improvement in ventilatory function and gas exchange has been repeatedly observed to occur thereafter.

It is apparent from this that the answer to how much or how frequent the treatment should be, or how long they should be, depends on the character and severity of the disease. Obviously, *enough should be used to produce the desired effect.* Sometimes the practical approach to the problem depends on the individual patient. Usually treatments of a half to one hour out of every three or four hours in a severe case are well tolerated. Occasionally, continuous therapy until effective recovery is achieved may be used. We have used heated aerosol by IPPB in some instances for two to three weeks continuously, where desirable, with interruption only for meals. In some of the little children, however, it is occasionally not possible to continue the treatments longer than 15 minutes at a time. However, we have had children as small as two years of age who have been on continuous treatment for as long as two weeks by tracheostomy. In some of the more severe cases, the use of intermittent heated aerosol by IPPB with permanent tracheostomy is necessary in order to provide a means of evacuating the mobilized secretions.

So far as we have been able to ascertain, from a massive experience, there are no real contra-indications to effective humidification therapy, and there is no such thing as delivering too much moisture to the respiratory tract. Invariably as patients improve the amount of sputum production decreases, even though the intensity of treatment may continue, and most patients who are capable of complete resolution of their process will ultimately clear completely to the point of no sputum production in spite of continued treatment. Obviously, it is not always possible for complete resolution to occur. The result is largely dependent upon the character of the underlying disease and the degree of reversibility.

continued on page 24

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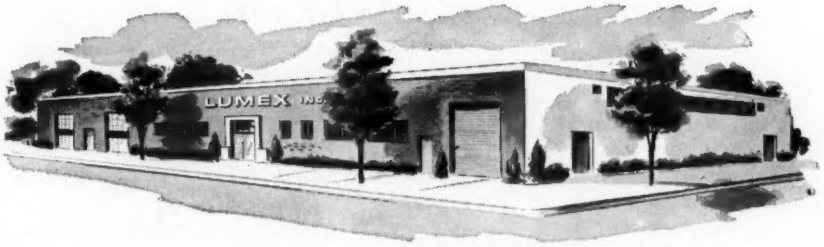


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continued from page 21

Ordinarily super-heated aerosol should not be used directly into the tracheostomy unless one is unfortunately faced with the problem of crusting already having occurred in the trachea prior to treatment. For routine post-tracheostomy care, tepid mist aerosol is desirable.

There is one very serious complication of improper use of heated aerosol units, and that is continuation of oxygen flow through the nebulizer if the unit has stopped producing aerosol either because of insufficient fluid in the apparatus or because of plugging of the jets. The continued inhalation of hot dry oxygen will produce serious if not lethal effects on the tracheobronchial tree as a result of drying and crusting – the very thing the treatment is designed to prevent.

Table

INDICATIONS FOR HEATED AEROSOLS

Tepid

1. Croup
2. Status asthmaticus
3. Tracheostomy
4. Refractory chronic bronchitis or bronchiectasis, including cystic fibrosis
5. Severe bronchopneumonia with tenacious obstructing exudate
6. For prolonged assisted or controlled ventilation in patients prone to accumulation of viscid secretions.
7. Acute laryngotracheobronchitis or bronchiolitis
8. Acute sinusitis and pharyngitis

Super-heated

1. To obtain a diagnostic sputum, particularly for bronchogenic carcinoma
2. Any situation listed above in which rapid clearing of generalized obstructing secretions is desirable, or tepid mist was not adequate.

**References:**


1. "Considerations in Humidification by Nebulization," by Ivan E. Cushing, M.D. and William F. Miller, M.D., in **Diseases of the Chest,** 34:4, 1958.
2. "Preoperative Recognition and Treatment of Bronchopulmonary Disease," by William F. Miller, M.D., J. Robert Cade, M.D., and Ivan E. Cushing, M.D., in **Anesthesiology,** 18:483, 1957.
3. Chapter on Aerosol Therapy by H. A. Abramson, in MEDICAL PHYSICS, volume 2, pp 824-30, Edited by Otto Glasser. Yearbook Publishers, Chicago.
4. "An Aerosol Method of Producing Bronchial Secretions in Human Subjects: A Clinical Technic for Detection of Lung Cancer," by H. A. Bickerman, M.D., E. E. Sproul, M.D., and A. L. Barach, M.D., in **Diseases of the Chest,** 33:4, 1958.


## GETTING "HIGH" ON AIR OR DRINK MAY AGE YOU

There's a curious link between growing old, mountain air, liquor and cigarets, a scientist has suggested.

It's a part of a new theory on why we grow old—perhaps because our body loses its ability to use oxygen, explained Dr. Ross A. McFarland of Harvard University.

When we smoke or drink liquor or climb mountains, we grow temporarily older by cutting down on the oxygen our body can use.

Dr. McFarland's theory grew out of similarities he discovered in the sensitivity of the eyes of pilots and aging persons to light.

The eyes are an excellent indicator of the body's use of oxygen, because their sensitivity to light is so dependent on the supply of oxygen to the eye and brain.

Older persons almost always have failing sight, and need more light to see. By the same standard, pilots flying in the sparse oxygen of high altitudes also lose part of their ability to see.

Dr. McFarland was able to measure these losses with delicate instruments, and concludes that in both cases the sight loss is due to oxygen want. The same thing happens when we drink liquor or smoke, he found.

Two or three good stiff highballs literally make the drinker high as far as oxygen need goes. It puts him for all intents at an altitude of 10,000 feet. His body gets only the amount of oxygen he would get breathing the air at that altitude.

Three cigarets put him at an altitude of 7,500 feet, by the same standard, Dr. McFarland explained.

*—from the New York Times*


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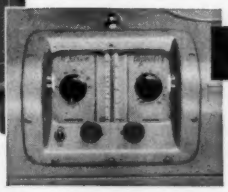

**Lighted Control Panel**

note oxygen flowmeter (center), temperature and ventilation controls (left and right), oxygen controls (bottom).

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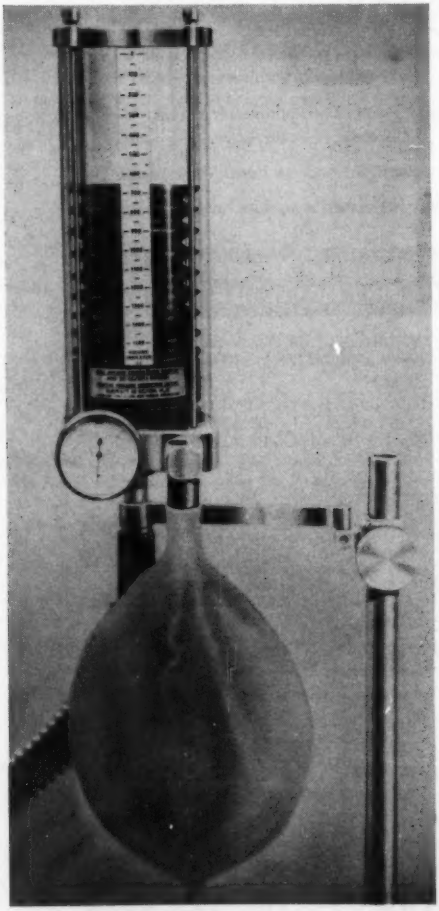
## EQUIPMENT NEWS

*(Information and photographs are supplied by the manufacturers or distributors.)*

Air-Shields, Inc., Hatboro, Pennsylvania, has introduced the Roswell Park VENTIMETER, an anesthesia machine accessory to indicate tidal volume. Its design utilizes a volume indicating bellows, but retains the familiar breathing bag, for getting the "feel" of the patient's respiratory pattern, and for providing manual assistance to



inspiration. Pressures are indicated on an aneroid manometer. The patient's ventilation (both volume and pressure) may be monitored during spontaneous breathing, when manually assisting or when using a mechanical ventilator.

Direct and continuous visual indication of tidal exchange is provided by use of the bellows (1500 cc capacity) with volume indicator scale in increments of 50 cc. The manometer is calibrated in cm of water. An automatic overflow valve prevents over-distention when using high flow techniques. No popoff adjustments on gas machines or chimney are needed.

The VENTIMETER can be adapted to fit any absorber, the rebreathing bag being removed from the absorber and relocated on the VENTIMETER.

**No. 524**

### Venti-Breather

Venti-Breather Products, Inc., of Washington, D. C., announces the release of a new device for rescue breathing, called the Venti-Breather.

The Venti-breather's flexible face mask separates the rescuer from the victim in a sanitary manner, and fits both adults and children.

The rescuer breathes through a special tube to inflate the victims' lungs. As the lungs deflate, a unique one-way valve directs the exhaled air away from the rescuer's mouth and face.

Nothing is inserted in the throat of the victim to cause gagging, vomiting or injury to the throat.

The Venti-Breather permits all of the advantages of the mouth-to-mouth method, says the

manufacturer, without the repulsiveness sometimes associated with mouth-to-mouth breathing.

**No. 525**

## Hydrojette Mobile Humidifier

Air-Shields, Inc., of Hatboro, Pennsylvania, has introduced a new tracheotomy attachment for use with their Hydrojette Mobile Humidifier.

The neck piece is molded of soft plastic with a smooth flat surface under the chin. A large opening in the front center provides easy access to the tracheotomy tube. This opening is covered by a piece of thin, clear vinyl plastic held in place by two gray plastic fittings.

One of these fittings has a hole which provides for escape of gases, and since there is a more than adequate supply of fresh air, there is a continual washout of carbon dioxide.

To the other gray plastic fitting is attached the lightweight wire-reinforced vinyl conducting tube from the cast aluminum head that fits onto the Hydrojette.

The neck piece and tubing are also available without the aluminum head for the Hydrojette, so they can be used with other aerosol equipment. **No. 526**

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# ABSTRACTS

**"Efficiency of Silicone Antifoam Agents in the Control of Pulmonary Edema,"** by Reuben S. Balagot, M.D., Max S. Sadove, M.D., and Rosauro Reyes, M.D., in *Anesthesia & Analgesia*, 39:197 (1960).

Earlier papers of Luisada and Curry have reported experimental studies on rabbits in which pulmonary edema was induced artificially with epinephrine, and then treated with various agents, as ethyl alcohol, octyl alcohol, silicones, etc.

Those studies were repeated by these investigators, using 2-ethyl hexanol, Alevaire, and two silicone compounds. The latter both contained Superinone, glycerine and potassium bicarbonate in the same concentrations as in the Alevaire they used (ordinary Alevaire contains sodium bicarbonate instead of potassium bicarbonate). The one silicone compound has 0.01% Dow-Corning Silicone A (polymerized methyl siloxan); the other just half as much.

Their findings were that for pulmonary edema induced in this fashion, all of these agents were effective—the Alevaire being as much so as the 2-ethyl hexanol; but most effective was the stronger of the two silicone solutions. They did not evaluate ethyl alcohol in this study.

**continued on page 28**


## AMERICAN ASSOCIATION OF INHALATION THERAPISTS

**THE AMERICAN ASSOCIATION OF INHALATION THERAPISTS is an organization of therapy technicians working: In hospitals, for firms providing emergency therapy service, and for municipal organizations. The Association is sponsored jointly by the American College of Chest Physicians and the American Society of Anesthesiologists. Three doctors from each group comprise the joint Board of Advisors to the AAIT, which has nearly 900 members in the United States, Canada, and several countries abroad.**

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**"Some Effects of Mechanical Respirators Upon Respiratory Gas Exchange and Ventilation in Chronic Pulmonary Emphysema,"** by A. Gregory Jameson, M.D., M. Irene Ferrer, M.D., and Rejane M. Harvey, M.D., in *Am. Rev. Resp. Dis.*, **80**:510 (59).

This paper presents a study of the effects of four different respirators on the ventilation and gas exchange of patients with chronic obstructive pulmonary emphysema. In all cases, compressed air rather than oxygen was used, and no bronchodilators were given, in order to assess the effects of the respirators by themselves.

The apparatus evaluated were the Bennett IPPB, the Mine Safety Pneophore (PBR), the Huxley chest respirator, and the Drinker full tank respirator.

They found that there is a direct relationship between the change in ventilation produced by a respirator and the resulting changes in the levels of the $O_2$ saturation and $CO_2$ content of the arterial blood, with greater change in $CO_2$ than in $O_2$. When there was an increase of more than 25% in ventilation, there was a corresponding decrease in $CO_2$ content. Arterial $O_2$ saturation did not increase, however, until ventilation rose over 35%.

The averaged results of short-term experiments (20 to 120 minutes) indicated that the Pneophore and the Bennett are about equally effective in increasing the ventilation, while the Huxley "is not at all effective."

The comparative figures for per cent increase in $O_2$ saturation and per cent decrease in $CO_2$ content are:

| | Bennett | Pneophore | Huxley | Drinker |
|---|---|---|---|---|
| $O_2$ | up 3.4% | up 6.7% | down 1.9% | up 10% |
| $CO_2$ | down 7.0% | down 4.0% | down 0.8% | down 6.0% |

The Drinker was not used in the chronic studies (2-15 hours daily for several successive days). "These long-term chronic studies show that the PBR and the Bennett respirators can quickly return to nearly normal levels the abnormal values of arterial blood $O_2$ saturation, $CO_2$ tension and $CO_2$ content in the severely emphysematous patients with acute bouts of respiratory failure, and that these more normal values can be maintained by the continued (intermittent) use of the respirators."


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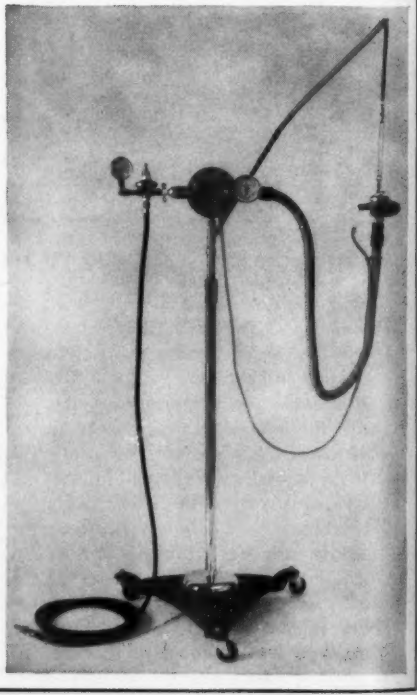

**"Mechanics of Breathing,"** by Ernst O. Attinger, M.D. and Maurice S. Segal, M.D., in *Am. Rev. Resp. Dis.*, 80:38, 46 and 53 (3 parts), (59).

The first section of this three-part paper deals with the elastic and resistive properties of the lung, and with something which the authors call the overall time constant of the lungs. The elastic properties are commonly referred to as *compliance*, i.e., volume change per unit pressure change. A stiff lung has low compliance; an easily distensible one has high compliance.

In contrast to the elastic forces, the resistive ones are dependent on the speed at which a volume change occurs. They are usually measured collectively as *mechanical resistance*, expressed as pressure required to produce a given airflow. Because the calibre of the airways is a function of lung volume, mechanical resistance is considerably higher at low lung volumes than at high.

The second section of the paper deals with the work of respiration. Factors responsible for an increase in this work are discussed, and methods of estimating the metabolic costs of breathing are reviewed. Proper application of mechanical ventilatory devices is discussed in relation to conditions of the lung-thorax system.

The last section has to do with the "Influence of Ventilatory Mechanics upon Gas Exchange and Pulmonary Circulation." The effect of the movements of breathing upon cardiac stroke volume and vascular resistance is discussed, and the effects of $O_2$ and $CO_2$ on pulmonary circulation are reviewed.

**"Cardiopulmonary Function in Chronic Pulmonary Emphysema,"** by M. Henry Williams, M.D. and Lenore R. Zohman, M.D., in *Am. Rev. Resp. Dis.*, 80:689 (59).

This report presents results of ventilatory studies and measurements of pulmonary vascular pressures and flows, diffusion of gases in the lungs, and arterial blood gas composition during rest and exercise.

Outstanding abnormalities were airway obstruction and reduced diffusing capacity, the latter due to the reduced alveolar capillary surface area which is typical of emphysema. The major contribution to hypoxemia was judged to be disordered ventilation/perfusion relationships.

—J.F.W.

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—Sadove, M. S.: J.A.M.A. 160:876 (March 10) 1956

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